

# Autostart AS731/732 Generator Controller Installation Instructions

mi6129  
revision H, 10<sup>th</sup> Sept 2007  
catalogue section 75

## Section B: Programming, firmware V1.00 – V2.2.x

MURPHY

Please read the following information before installing. A visual inspection of this product for damage during shipping is recommended before installation. It is your responsibility to ensure that qualified mechanical and electrical technicians install this product. If in doubt, please contact your local Murphy representative.

### Introduction

This document details the program set-up of the Autostart AS731 and AS732 generator controllers. Further information about specifications, installation and operation may be found in the following documents:-

Ref.	Title
ms6127	AS731 sales bulletin and technical spec.
ms6343	AS732 sales bulletin and technical spec.
mi6128	AS731/732 installation A: panel installation and wiring
mi6243	AS731/732 installation C: AS730 - AS731/732 retrofitting
mi6130	AS731/732 operation
mi6131	AS731 communications and AS7CN PC software
mi6344	AS732 RS485 MODBUS protocol

### Programming / configuration

The AS731/732 has over 60 programmable functions, including timers, trip levels, inputs, outputs and fault monitoring options. The 'check sheet' pages overleaf list all the available program functions and settings, plus the default factory settings, and a description for each; the description includes the applicable firmware level where new functions or options have been added. Major update V2.00 includes functionality to support the AS732 RS485 MODBUS ASCII features; update V2.1.x supports the AS732 MODBUS RTU protocol.



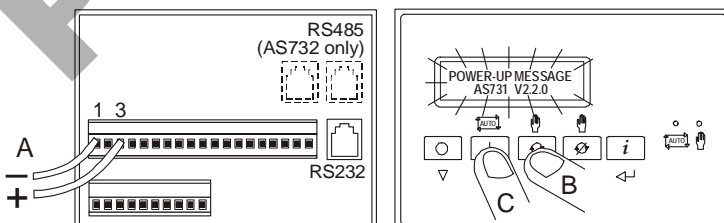
Each Autostart **MUST** be programmed correctly before use. **Failure to set up the program correctly can result in damage to the Autostart, generator and electrical equipment.**

Program setup can be carried out in one of two ways:-








- 1) front facia keys allow entry to 'program mode', where the operator views and edits the program parameters in sequence. This method is convenient for small program changes or on-site work.
- 2) Murphy software model AS7CN allows program 'profiles' to be created, edited and stored on a PC. These profiles may then be download quickly and error free using an RS232 link between PC and Autostart. This method allow quick, error-free and repeatable setup for larger batches of units.

Full details about the installation and operation of software AS7CN can be found in document reference mi6131.






### Programming from the front facia









To access program mode:-

- Ensure that the unit is switched off
- (A) Make the following minimum electrical connection:-
  - Positive (+) DC to pin 3
  - Negative (-) DC to pin 1Other terminals may be connected as normal or left open circuit.
- (B) Press and hold the  (manual start) key.
- (C) Press and hold the  (on/auto) key
- Hold down both keys during the power up message. Release both keys as soon as the display reads 'program mode'.
- The display may ask the user to enter a 4 figure PIN (Personal Identification Number). Use the , ,  and  keys (as labelled below each key) to change the display to the correct PIN, then press . The factory default PIN is 1234.
- Once the correct PIN is entered (or if PIN entry is not requested), Autostart displays the first programmable function, 'Start delay'.

To re-program each function:-

- Use the  and  keys (and the  and  keys for text messages) to change the option or value displayed. When the correct setting is displayed, press  to confirm the value/option and move on to the next function. Full details of each program function and its options are listed in the following pages.

To exit program mode and save changes:-

- At the end of the programming sequence, the LCD displays 'exit program mode?'. To exit program mode and save changes, press the  key, wait a second or so, then press the  (OFF) key when prompted. Alternatively, press the , ,  or  keys to view the program settings again.

### Programming through the RS232 link

For full details of how to program via the RS232 link, please refer to our separate document reference mi6131.

Note: when programming from the front facia, the program sequence is as listed overleaf. When programming with the PC software (and communication link), the functions and options are identical, but are arranged differently on several screens, with each screen displaying several program options at once.

## Programming Check Sheets

Customer/Engine/Site Name:.....

AS731/732 serial number:.....

Job ref. ....

Programmed by .....

Date:.....

Function	Settings (tick as appropriate):		Description
	Default	New	
Start delay	<input type="checkbox"/> 0:02	<input type="checkbox"/> ..... min ..... sec	<b>(0 – 10 mins)</b> In Auto mode, this timer sets a delay between a remote start (the activation of pin 18) and the first engine start attempt.
Preheat	<input type="checkbox"/> 00 sec	<input type="checkbox"/> ..... sec	<b>(00 – 59 secs)</b> If any of the programmable outputs (see sections below) have been programmed to one of four 'preheat' functions, that output will activate for this time period before each engine crank attempt.
Crank	<input type="checkbox"/> 10 sec	<input type="checkbox"/> ..... sec	<b>(03 – 59 secs)</b> Sets the maximum time for each engine crank attempt.
Crnk cool	<input type="checkbox"/> 10 sec	<input type="checkbox"/> ..... sec	<b>(03 – 59 secs)</b> Allows the batteries & starter motor to recover before repeat crank attempts are made.
Start attempts	<input type="checkbox"/> 3	<input type="checkbox"/> ..... attempts	<b>(1 – 9)</b> Sets the maximum number of crank attempts before Autostart signals a 'start fail' alarm.
Override	<input type="checkbox"/> 15 sec	<input type="checkbox"/> ..... sec	<b>(02 – 59 secs)</b> Immediately after an engine start, this time period is used to hold off fault shutdowns (e.g. oil pressure).
Speedsig	<input type="checkbox"/> 01 sec	<input type="checkbox"/> ..... sec	<b>(01 – 59 secs)</b> This holds off a 'no speed signal' fault shutdown immediately after engine start, particularly if a 'soft-start' AC alternator is used (where there is initially little or no AC frequency signal).
Warmup	<input type="checkbox"/> 02 sec	<input type="checkbox"/> ..... sec	<b>(00 – 59 secs)</b> After an engine start in auto mode, this timer may be used to delay the operation of a 'gen. contactor' output (i.e. delay the loading of the generator).
Restore	<input type="checkbox"/> 0:03:00	<input type="checkbox"/> ..... hrs ..... min ..... sec	<b>(0 – 1 hour)</b> In Auto mode, after a mains return (clearing of a 'remote start' condition), this timer sets a delay before Autostart transfers the load from the generator back to the mains AC supply.
Eng.cool	<input type="checkbox"/> 0:03:00	<input type="checkbox"/> ..... hrs ..... min ..... sec	<b>(0 – 1 hour)</b> In Auto mode, this timer lets the engine run off load (and cool down) before a return to standby mode.
Energ 2 stop	<input type="checkbox"/> 5 sec	<input type="checkbox"/> ..... sec	<b>(05 – 59 secs)</b> Any output set to 'energised to stop' (fuel) output activates as soon as the engine is required to stop. The output de-activates after the engine has stopped and this further time period has expired.
Rem test	<input type="checkbox"/> 1 min	<input type="checkbox"/> ..... min	<b>(1 – 240 mins)</b> A engine or generator test run may be initiated from a remote PC over the communications link. After the communication link is broken, Autostart will continue to run the engine for this time period.
Mains fail	<input type="checkbox"/> 1 sec	<input type="checkbox"/> ..... sec	<b>(1 – 59 secs) V1.02 or higher firmware only.</b> This timer may be used to delay activation of a 'mains contactor open' output (see 'programmable outputs' below for further details).
Contactor	<input type="checkbox"/> 5 sec	<input type="checkbox"/> ..... sec	<b>(0 – 30 secs) V1.02 or higher firmware only.</b> This timer only operates when both 'generator contactor' and 'mains contactor open' outputs are programmed. The 'contactor' delay sets a minimum window of time between the release of one (mains or generator) contactor and the engagement of the other (or same) contactor, a requirement for certain loads (e.g. motors).
Hours run:	<input type="checkbox"/> ON	<input type="checkbox"/> OFF	<b>(ON or OFF)</b> Enables or disables the display of the hours run counter.

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Function	Settings (tick as appropriate):		Description
	Default	New	
CF:	<input type="checkbox"/> not used	<input type="checkbox"/> charge alt. <input type="checkbox"/> mains charge	Sets the operation of the Autostart's 'charge fail' warning, as measured through pin 2:- <b>charge alt:</b> a charge fail warning will only occur if the engine is running and the fault override time has expired. <b>mains charge:</b> a charge fail warning will occur whether the engine is stationary or running, but not during an engine start sequence. <b>not used:</b> use this setting to disable the charge fail warning. Leave pin 2 open circuit.
Battery LO:	<input type="checkbox"/> 10 V	<input type="checkbox"/> ..... V	<b>(10 – 30 V DC)</b> Autostart gives a 'low battery volts' warning if the DC supply falls below this voltage.
Battery HI:	<input type="checkbox"/> 32 V	<input type="checkbox"/> ..... V	<b>(12 – 35 V DC)</b> Autostart gives a 'high battery volts' warning if the DC supply rises above this voltage.
Charge start	<input type="checkbox"/> --	<input type="checkbox"/> ..... V	<b>(- , 1 - 26 V DC) V1.02 or higher firmware only.</b> If battery DC voltage falls below this level (and provided auto mode is selected), the Autostart will attempt a 'charge start', cranking and running the engine in an attempt to recharge the batteries (see also 'charge time' below). The 'charge start' feature does not operate if manual mode is selected, and may be disabled in auto mode by using a '- ' or '0V' setting.
Charge time	<input type="checkbox"/> 30 min	<input type="checkbox"/> ..... min	<b>(1 – 60 min) V1.02 or higher firmware only.</b> Once the above 'charge start' is initiated, the AS731/732 will run the engine for this time then return the engine to standby.
WL crank cut:	<input type="checkbox"/> No	<input type="checkbox"/> YES	This setting is only available if 'charge alt' option has been selected above, and allows the rising charge alternator WL voltage to be used to trigger the automatic release of the engine starter motor (release is triggered at approximately 10V, as measured through pin 2). This feature can be used in addition to, or instead of, the generator AC frequency or magnetic pickup 'crank cut' settings (see below). This option allows use with generator AC (50/60Hz) alternators is a 'soft-start' type (where there is little or no AC output until after the engine is fully running).
AC sense (AC gen fitted?)	<input type="checkbox"/> YES	<input type="checkbox"/> NO	<b>(Yes or No)</b> Sets whether or not the generator AC (50/60Hz) signal is used to sense engine speed.
Gen phases	<input type="checkbox"/> 3	<input type="checkbox"/> .....	<b>(3, 2 or 1)</b> Allows Autostart to be used with 3, 2 or single phase generators.
AC display:	<input type="checkbox"/> L-N	<input type="checkbox"/> L-L	<b>(L-N or L-L)</b> Sets whether the Autostart displays 'line to neutral' or 'line to line' voltage, both during normal operation and when programming AC voltage trip levels.

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Function	Settings (tick as appropriate):		Description
	Default	New	
Gen UV trip:	<input type="checkbox"/> 200 V	<input type="checkbox"/> ..... V	<b>(50 – 500 VAC)</b> 'gen. under volts' is indicated if any of the three AC voltages fall below this set level. The Autostart's response to this fault – engine shutdown or load release – is also programmable (see below).
Gen UV action:	<input type="checkbox"/> RELEASE	<input type="checkbox"/> SHUTDOWN	Sets the response to a generator under voltage condition:- <b>Release:</b> Autostart takes the generator off load, displays 'Gen. Under Volts', but allows the engine to run on. Autostart automatically attempts to reload the generator if the voltage rises to within normal limits (except when an input has been programmed to 'load reset' - see 'programmable inputs' section below). <b>Shutdown:</b> causes immediate unload and shutdown of the generator, and display of 'Gen Under volts'.
Gen UV OK:	<input type="checkbox"/> 210 V	<input type="checkbox"/> ..... V	<b>(50 – 500 VAC)</b> This sets the level above which Autostart considers the generator AC voltage is OK. Autostart never attempts to load the generator unless the AC voltage is above this programmed level.
Gen OV trip:	<input type="checkbox"/> 500 V	<input type="checkbox"/> ..... V	<b>(50 – 600 VAC)</b> The Autostart shuts down the generator and indicates GEN OVERVOLTS if any of the three AC voltages rise above this programmed level.
CT ratio	<input type="checkbox"/> 1000 : 5 A	<input type="checkbox"/> ..... : 5 A	<b>(10:5 to 5000:5)</b> Autostart measures AC generator current by use of current transformers (with 5 Amp secondary coils). To correctly measure AC current, the CT ratio must be entered here.
Full load:	<input type="checkbox"/> 500 A	<input type="checkbox"/> ..... A	<b>(2 to 5000 Amps)</b> Set this to match the full load current rating of the generator. This setting (with the IDMT constant below) sets the overload/trip-time response for the over-current warning and shutdown alarms.
IDMT constant	<input type="checkbox"/> 36	<input type="checkbox"/> .....	<b>(10 to 50)</b> The overload current/trip time curve has an IDMT characteristic, giving a quicker response for large overloads and a slower response for smaller overloads. Higher settings of the IDMT constant result in longer trip times (for a fixed over current level). This setting should be made in consultation with the alternator spec.
I trip (xFLC)	<input type="checkbox"/> 3.0	<input type="checkbox"/> .....	<b>(1.0 – 3.0)</b> Allows a user-programmable maximum current limit, above which Autostart instantly trips out (overriding the IDMT response). The setting is expressed as multiples of the full load current (FLC) setting (see above).
Over I:	<input type="checkbox"/> RELEASE	<input type="checkbox"/> SHUTDOWN	Sets the response to a generator over current condition:- <b>Release:</b> Autostart takes the generator off load, displays 'Gen. Over I', but allows the engine to run on. Autostart will automatically attempt to reload the generator if the current falls to within normal limits (except when an input has been programmed to 'load reset' - see programmable input section below). <b>Shutdown:</b> Autostart immediately unloads and shuts down the generator, and displays 'Gen Over I'.

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Function	Settings (tick as appropriate):		Description
	Default	New	
Crank cut:	<input type="checkbox"/> 20 Hz	<input type="checkbox"/> ..... Hz	<b>(5 – 25 Hz.)</b> Sets the AC frequency for engine crank release, when AC is used for speed sensing.
Undr freq:	<input type="checkbox"/> 45 Hz	<input type="checkbox"/> ..... Hz	<b>(40 – 60 Hz.)</b> Sets the generator under frequency level, when generator AC is used for speed sensing.
Over freq:	<input type="checkbox"/> 55 Hz	<input type="checkbox"/> ..... Hz	<b>(50 – 70 Hz.)</b> Sets the generator over frequency shutdown trip, when the AC is used for speed sensing.
Over Hz	<input type="checkbox"/> shutdown	<input type="checkbox"/> ignore	<b>V2.2.x or higher firmware only.</b> An 'ignore' setting inhibits shutdown on generator over frequency, provided that a) engine speed is sensed by a magnetic pickup AND b) the measured engine speed is below the engine overspeed trip level. The 'ignore' option is typically used when excessive high frequency noise is present on the AC signal.
Mag pickup	<input type="checkbox"/> NO	<input type="checkbox"/> YES	<b>(YES or NO)</b> Enables or disables engine speed sensing via magnetic pickup.
MPU teeth:	<input type="checkbox"/> 60	<input type="checkbox"/> ..... teeth	<b>(1 – 250 teeth)</b> When a magnetic pickup is used, enter the number of flywheel teeth.
Crank cut:	<input type="checkbox"/> 525	<input type="checkbox"/> ..... RPM	<b>(100 – 1500 RPM)</b> Sets the engine crank release speed, when speed is measured by magnetic pickup.
Undr speed:	<input type="checkbox"/> 1350	<input type="checkbox"/> ..... RPM	<b>(500 – 3550 RPM)</b> Sets the engine underspeed level, when speed is measured by magnetic pickup.
Over speed:	<input type="checkbox"/> 1650	<input type="checkbox"/> ..... RPM	<b>(1000 – 5400 RPM)</b> Sets the engine overspeed shutdown trip, when measured by magnetic pickup.
O/S override	<input type="checkbox"/> 0 %	<input type="checkbox"/> ..... %	<b>(0 – 25%)</b> Sets an additional speed overshoot (as percentage of the overspeed level above), permitted immediately after engine start (for 'speed sig. delay).
U F/RPM:	<input type="checkbox"/> RELEASE	<input type="checkbox"/> SHUTDOWN	Sets the response to a generator under speed/frequency condition:- <b>Release:</b> Autostart takes the generator off load, displays UNDER SPEED/FREQ, but allows the engine to run on. Autostart will automatically attempt to reload the generator if the speed/frequency rises to within normal limits (except when an input has been programmed to 'load reset' - see programmable input section below). <b>Shutdown:</b> Autostart immediately unloads and shuts down the generator, and displays UNDER SPEED/FREQ.
Load in MAN:	<input type="checkbox"/> NO	<input type="checkbox"/> YES	When the generator is running in manual mode, this setting affects whether or not Autostart will attempt to load the generator in response to a remote start (if pin 18 goes open circuit) or mains fail condition:- <b>YES:</b> Autostart activates any 'gen. contactor' output, providing the engine is running within normal limits. <b>NO:</b> the 'gen. contactor' output never operates in manual mode.
Remote start	<input type="checkbox"/> OP +VE	<input type="checkbox"/> CL +VE	Allows the remote start terminal (pin 18) to be activated by either 'opening from positive' or 'closing to positive'.
Input 3:	<input type="checkbox"/> close -VE	<input type="checkbox"/> open -VE	Sets the 'active' state of programmable switch inputs 3. The input may be set up for remote contacts which open or close when 'active'; the contacts must be wired between the input and battery negative.

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Function	Settings (tick as appropriate):		Description
	Default	New	
Input 3 action:	<input type="checkbox"/> +++not used+++		<p>Sets the 'action' which Autostart takes when input 3 is made active:-</p> <p><b>+++not used+++</b>: use this selection when the input is not used. The input may then be left open circuit.</p> <p><b>Shutdown: override</b>: used with remote fault sensor contacts to trigger a shutdown of the generator. An active input will only trigger a response if the engine is running and the fault override timer has expired. Typical uses: generator under voltage.</p> <p><b>Shutdown: no override</b>: similar to the above, but an active input will trigger a shutdown response at ANY time (whether the engine stationary, starting or running). Typical uses: fire, coolant loss, earth fault.</p> <p><b>Warning: override</b>: used with remote fault contacts to trigger a fault warning (but not an engine shutdown). An active input will only trigger a response if the engine is running and the fault override time has expired. Typical uses: general pre-alarms, e.g. engine/alternator temperature warnings, over-current warning</p> <p><b>Warning: no override</b>: similar to the above, but an active input will trigger a warning at ANY time. Typical uses: low/high fuel level, low ambient temperature.</p> <p><b>Display: override</b>: may be used to display a status message, without activation of any alarm or warning outputs. An active input will only trigger a message if the engine is running and the override time has expired. Typical uses: 'generator volts OK', 'full load'.</p> <p><b>Display: no override</b>: used to trigger a display message, like the above, but the input may be activated at any time. Typical use: 'battery charger boost', 'mains available'.</p> <p><b>Load release</b>: Autostart de-activates any 'gen. contactor' output and displays a 16 character message. This action is non-latching: unless another input has been programmed to 'load reset' (see below), Autostart will attempt to reload the generator when the 'load release' input clears.</p> <p><b>Lamp test</b>: Autostart displays LAMP TEST, lights both Auto and Manual mode LEDs and activates any output programmed to lamp test.</p> <p><b>Manual restore</b>: (AMF applications) an active input will indefinitely inhibit an automatic load transfer back to the mains after a mains return.</p> <p><b>Test off load</b>: triggers a generator start and run off load (display says 'TEST').</p> <p><b>Alarm mute</b>: used to turn off any 'alarm (muteable)' output, without affecting indication of fault.</p> <p><b>Load reset</b>: permits an operator-controlled re-activation of a 'gen. contactor' output once the Autostart has automatically taken the generator off load (e.g. because of a low frequency trip). Autostart only attempts to re-activate the 'gen.contactor' output when the 'load reset' input is made active, providing that the generator is running within normal limits.</p> <p><b>Remote Mode Control</b>: Allows Auto or Manual operating mode to be remotely selected. An active input causes the unit to adopt manual mode; an inactive input causes the unit to default to Auto mode. When this option is selected, the front facia MODE key is disabled.</p> <p><b>Manual start</b>: allows the input to be used with a remote 'manual start' button. When the Autostart is in manual mode, momentary activation of this input causes an automatic engine start sequence.</p> <p><b>Manual stop</b>: allows the input to be used with a remote 'manual stop' button. When the Autostart is in manual mode, momentary activation of this input causes the engine to stop.</p>
	<input type="checkbox"/> Shut: override		
	<input type="checkbox"/> Shut: no override		
	<input type="checkbox"/> Warn: override		
	<input type="checkbox"/> Warn: no override		
	<input type="checkbox"/> Disp: override		
	<input type="checkbox"/> Disp: no override		
	<input type="checkbox"/> Load release		
	<input type="checkbox"/> Lamp test		
	<input type="checkbox"/> Manual restore		
	<input type="checkbox"/> Test off load		
	<input type="checkbox"/> Alarm mute		
	<input type="checkbox"/> Load reset		
	<input type="checkbox"/> Remote mode control		
	<input type="checkbox"/> Manual start		
	<input type="checkbox"/> Manual stop		
Input 3 message	<input type="checkbox"/> INPUT 3	<input type="checkbox"/> .....	<p>This 16 character fault or warning message is programmed when input 3 has been set with certain 'actions' above. Whenever the input is activated, this programmed message (e.g. a fault message) is displayed on the front facia display. To change the message, use the ▷ key to select each character position (indicated by the underlining cursor), and the △ and ▽ keys to amend each character's letter or number. Press the &lt;⏎ key to enter when the full, correct message is displayed.</p>

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Function	Settings (tick as appropriate):		Description																																																												
	Default	New																																																													
Input 4:	<input type="checkbox"/> close -VE	<input type="checkbox"/> open -VE	Sets the 'active' state of programmable switch input 4 (programming as for input 3 above)																																																												
Input 4 action	<input type="checkbox"/> +++not used+++	<input type="checkbox"/> .....	Sets the type of 'action' for input 4 (programming as for input 3 above).																																																												
Input 4 message	<input type="checkbox"/> INPUT 4	<input type="checkbox"/> .....	Sets a 16 character message for input 4 (programming as for input 3 above).																																																												
Input 5:	<input type="checkbox"/> close -VE	<input type="checkbox"/> open -VE	Sets the 'active' state of programmable switch input 5 (programming as for input 3 above)																																																												
Input 5 action	<input type="checkbox"/> +++not used+++	<input type="checkbox"/> .....	Sets the type of 'action' for input 5 (programming as for input 3 above).																																																												
Input 5 message	<input type="checkbox"/> INPUT 5	<input type="checkbox"/> .....	Sets a 16 character message for input 5 (similar programming to input 3 above).																																																												
LOP sensor	<input type="checkbox"/> LOP:swch clos-VE	<input type="checkbox"/> LOP:swch open-VE	Sets the oil pressure input (pin 12) for use with a resistive sender or fault switch:-																																																												
		<input type="checkbox"/> LOP:analogDATCON	<ul style="list-style-type: none"> <li>Two options allow for open-on-fault or closed-on-fault switches: the switch should be wired between pin 12 and pin 14 (pin 14 may be commoned with battery negative). An active input causes an immediate engine shutdown.</li> <li>Four options allow the input to be used with analog (resistive) pressure senders (Murphy, Datcon, VDO 5 bar and VDO 7 bar). The Autostart then provides measurement and display of oil pressure, and a warning (pre-alarm) response as well as engine shutdown. Two wire senders should be used, connected between pins 12 and 14. One wire (ground return) senders are <u>not</u> recommended, since small amounts of ground noise can result in large measurement errors. The calibration resistances (in Ohms) for each setting are as follows:-</li> </ul>																																																												
		<input type="checkbox"/> LOP:analogMURPHY																																																													
		<input type="checkbox"/> LOP:analog VDO 7																																																													
		<input type="checkbox"/> LOP:analog VDO 5																																																													
			<table border="1"> <thead> <tr> <th>Pressure (psi) sender</th> <th>0</th> <th>10</th> <th>20</th> <th>30</th> <th>40</th> <th>50</th> <th>60</th> <th>70</th> <th>80</th> <th>90</th> <th>100</th> </tr> </thead> <tbody> <tr> <td>Murphy</td> <td>240</td> <td>205</td> <td>171</td> <td>143</td> <td>123</td> <td>103</td> <td>88</td> <td>74</td> <td>60</td> <td>47</td> <td>33</td> </tr> <tr> <td>Datcon</td> <td>240</td> <td>200</td> <td>165</td> <td>135</td> <td>115</td> <td>95</td> <td>78</td> <td>63</td> <td>48</td> <td>35</td> <td>25</td> </tr> <tr> <td>VDO 5 bar</td> <td>10</td> <td>38.4</td> <td>65.0</td> <td>88.8</td> <td>110.3</td> <td>134.4</td> <td>154.8</td> <td>169.6</td> <td>206.2</td> <td>230.2</td> <td>254.2</td> </tr> <tr> <td>VDO 7 bar</td> <td>0</td> <td>17</td> <td>37</td> <td>53</td> <td>69</td> <td>83</td> <td>95</td> <td>107</td> <td>118</td> <td>130</td> <td>140</td> </tr> </tbody> </table>	Pressure (psi) sender	0	10	20	30	40	50	60	70	80	90	100	Murphy	240	205	171	143	123	103	88	74	60	47	33	Datcon	240	200	165	135	115	95	78	63	48	35	25	VDO 5 bar	10	38.4	65.0	88.8	110.3	134.4	154.8	169.6	206.2	230.2	254.2	VDO 7 bar	0	17	37	53	69	83	95	107	118	130	140
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Oil pressure:	<input type="checkbox"/> psi	<input type="checkbox"/> bar	<b>(PSI or Bar)</b> This and the two screens below only appear when an 'analogue' sender option is selected above. Use this screen to select the measurement units for displaying oil pressure and programming warning/shutdown trip levels: PSI (Pounds per Square Inch) or Bar ('atmospheres').																																																												
LOP shut:	<input type="checkbox"/> 12 psi	<input type="checkbox"/> .....psi/bar	<b>(10–100 PSI, or 0.6–6.9 Bar)</b> If the actual oil pressure falls below this setting, Autostart shuts down the engine and displays 'low oil pressure'.																																																												
LOP warn:	<input type="checkbox"/> 18 psi	<input type="checkbox"/> .....psi/bar	<b>(10–100 PSI, or 0.6–6.9 Bar)</b> If the actual oil pressure falls below this setting, Autostart gives a 'low oil pressure' warning, but allows the engine to run on.																																																												
Sender fail:	<input type="checkbox"/> on	<input type="checkbox"/> off	<b>V1.03 or higher firmware only.</b> If the impedance of the oil pressure sender goes out of normal measurement range, an 'on' setting results in a 'sender fail' warning. An 'off' setting will disable the sender fail warning.																																																												

In order to bring you the highest quality, full featured products, we reserve the right to change our specifications and designs at any time.

HET sensor

HET:swch clos-VE

HET:swch open-VE

HET:analogDATCON

HET:analogMURPHY

HET:analog VDO

Sets up the engine temperature input (pin 13) for use with a resistive sender or fault switch:-

- Two options allow use with open-on-fault or closed-on-fault switches. The switch should be wired between pin 13 and pin 14 (pin 14 may be commoned with battery negative). An active input causes an immediate engine shutdown.
- Four options allow the input to be connected to 'analog' (resistive) senders (Murphy, Datcon, VDO and BMI). With these settings, the Autostart is able to measure and display engine temperature, and provide a warning (pre-alarm) response as well as engine shutdown. Two wire senders should be used, connected between pins 13 and 14. One wire (earth return) senders are not recommended, since small amounts of earth noise can result in large measurement errors. The calibration resistances (in Ohms) for each setting are as follows:-

Temp (°C)	40	50	60	70	80	90	100	110	120	130	140
(°F)	104	122	140	158	176	194	212	230	248	266	284
sender											
Murphy	1029	680	460	321	227	164	120	89	74	52	40
Datcon	900	600	400	278	200	141	104	74	50	27	4
VDO	282.4	190.0	134.0	95.2	69.1	51.2	38.5	29.4	22.7	18.0	14.5
BMI	91	68	51	38	29	21	15	12	10	7	5.5

Eng temp in:

°C

°F

HET shut:

106 °C

..... °C / °F

HET warn:

102 °C

..... °C / °F

(°C or °F) This and the two screens below only appear when an 'analog' sender option is selected above. Use this screen to select the measurement units (Celcius or Fahrenheit) for displaying engine temperature, and for programming warning and shutdown trip levels.

(80-140 °C, or 176-284°F). If the actual engine temperature rises above this setting, Autostart shuts down the engine, displays 'high engine temp' and activates any appropriate alarm outputs.

(80-140 °C, or 176-284°F). Similar to above, except that Autostart only gives an engine temperature warning message, and allows the engine to run on.

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Function	Settings (tick as appropriate):		Description
	Default	New	
Prog output 1:	<input type="checkbox"/> Gen contactor	<input type="checkbox"/> .....	<p>Sets the function of programmable output 1 (pins 7 and 8). Over 40 different options are available:-</p> <p><u>Status and timing functions:-</u></p> <p><b>Auto mode</b> Output active when Autostart is in AUTO mode.  <b>Manual mode</b> Output active when Autostart is in MANUAL mode.  <b>Auto or Man mode</b> Output active when Autostart is in Auto or Manual modes.  <b>Start warning</b> Output active during the start and preheat delays, to warn of an engine start.  <b>Engine active</b> Output activates while the fuel relay is on, i.e. during starting and running.  <b>Engine running</b> Output active when the engine is running above the crank release speed.  <b>Ext. alarm enable</b> Used to enable or inhibit remote alarm circuits or annunciators. The output activates at the end of the fault 'override' time, and de-activates when the engine is stopped.  <b>Gen available</b> Output active when engine is running within voltage, freq. and oil pressure limits.  <b>Engine cooling</b> Output active during the engine 'cooling' time.</p> <p><u>Control functions:-</u></p> <p><b>Preheat mode 1</b> Used to control engine pre-heater circuits. Output active for preheat time only.  <b>Preheat mode 2</b> As above, but with output active during the preheat and engine crank times.  <b>Preheat mode 3</b> As above, but with output active for preheat, crank and fault override times.  <b>Preheat mode 4</b> As above, but with output active for preheat, crank and warm-up times.  <b>Energise to stop</b> Used for the control of Energised to Stop (ETS) type fuel solenoids. The output activates when the engine is required to stop, and de-activates after the engine has stopped and the subsequent 'energised to stop' timer has expired.</p> <p><b>Gen contactor</b> This output activates when the generator is required to be ON load. It is typically used to control a slave relay, the normally open contacts of which are used to control a generator contactor coil.</p> <p><b>Mains contactor open</b> <b>V1.02 or higher firmware only.</b> This output may be optionally used to control the mains contactor in an automatic mains fail (AMF) control panel. The output activates when the mains is required to be OFF load, in response to the state of the mains fail/remote start input (pin 18), but may be delayed by use of the 'mains fail' programmable timer. The output is typically used to drive a slave relay, the normally closed contacts of which are used to drive the mains contactor coil. The mains contactor coil is therefore enabled when this output is inactive, or if the Autostart is switched off or disconnected.</p> <p><b>Field flashing</b> May be used to control excitation of AC alternator field windings. Output activates at crank release and de-activates when Autostart senses AC volts.</p> <p><b>Louvre control</b> Used to control engine enclosure louvres. Output activates at the end of the start delay, and de-activates when the engine is stopped.</p> <p><b>Charger isolate</b> Used to isolate/connect a mains charger, using normally closed contacts of a connected slave relay. The output activates (isolating the charger) while the generator fuel is on.</p> <p><b>Lamp test</b> Output activates when a Lamp test input is active.</p> <p><b>PC cntl A mode 1/2</b> Output activates when communication to remote PC software is in progress, and operator clicks on monitoring screen 'output A' button. The output will toggle on and off with each click of the screen button. When the communication link is broken, the type 1 output always switches off, whereas the type 2 output remains in its current state.</p> <p><b>PC cntl B mode 1/2</b> As above, but output is activated by clicking the monitor mode screen 'Output B' button.</p> <p><b>Rem test on load</b> Output activates during a remote (PC initiated) Autostart test. This output can be used to isolate the mains supply and ensure an on-load test of the generator.</p> <p><u>Fault functions:-</u></p> <p><b>Common alarm</b> Output activates during all faults (shutdown or warning).  <b>Alarm(muteable)</b> As common alarm, but output may be turned off by use of an 'Alarm mute' input.  <b>Shutdown fault</b> Output activates after a shutdown fault, and de-activates when Autostart is reset.  <b>Warning fault</b> Output activates during a warning fault, and de-activates when the fault clears.  <b>Individual faults</b> Output actions for the remote signalling of individual faults:-  Start fail, Overspeed/Freq, Under speed/freq., Gen under volts, HI current warn, HI current shut(down), Gen out Limits, No speed signal, Mag.pickup fail, Emergency Stop, LOP shutdown, LOP warning, HET shutdown, HET warning, Input 3, Input 4, Input 5, Charge Fail, Battery Volts Low, Battery Volts High, Battery Volts fault.</p>

Function	Settings (tick as appropriate):		Description
	Default	New	
Prog output 2:	<input type="checkbox"/> Common alarm	<input type="checkbox"/>	Sets the function of programmable output 2 (pin 9). Program options as for output 1 above.
Prog output 3:	<input type="checkbox"/> +++not used+++	<input type="checkbox"/>	Sets the function of programmable output 3 (pin 10). Program options as for output 1 above.
Prog output 4:	<input type="checkbox"/> +++not used+++	<input type="checkbox"/>	Sets the function of programmable output 4 (pin 11). Program options as for output 1 above.
Site name:	<input type="checkbox"/> Murphy UK 001	<input type="checkbox"/>	Allows the setting of a unique site name, for use as an identifier during remote communication.
Phone out if:	<input type="checkbox"/> Never	<input type="checkbox"/> Shutdown only <input type="checkbox"/> Warn or Shutdown	Sets the conditions for which Autostart automatically dials out and establishes communications with remote PC software. A 'Warn or Shutdown' option also causes an automatic dial out in the event of a remote start/mains fail condition.
Phone-out number	<input type="checkbox"/> none	<input type="checkbox"/>	Sets the telephone number (for the modem and PC) that Autostart dials when the above condition is met. This screen is not displayed if the above is set to 'never'.
Power-up message	<input type="checkbox"/> **** MURPHY ****	<input type="checkbox"/>	Sets a 16 character message, displayed whenever the unit is powered up.
Switch on PIN	<input type="checkbox"/> (0000)	<input type="checkbox"/>	<b>(0000 – 9999):</b> this PIN may be used to prevent unauthorised control of the Autostart and generator. After the AS731/732 is powered up (by pressing the <input type="radio"/> key), the user must enter a correct Personal Identification Number (PIN) before any control of the generator (automatic or manual) is permitted. A setting of 0000 gives unrestricted access.
Program mode PIN	<input type="checkbox"/> (1234)	<input type="checkbox"/>	<b>(0000 – 9999)</b> This PIN may be used to restrict 'program mode' access. A setting of 0000 gives unrestricted access. Note that this PIN does not restrict program mode access over a communications link, which is covered by the 'Remote log on PIN' (see below).
Remote Log-on PIN	<input type="checkbox"/> (5678)	<input type="checkbox"/>	<b>(0000 – 9999)</b> This PIN may be used to prevent unauthorised communication from a modem/PC to an Autostart. A 0000 setting will give unrestricted remote access to monitoring, control and programming.
Mode change PIN	<input type="checkbox"/> (0000)	<input type="checkbox"/>	<b>(0000 – 9999)</b> The mode change PIN setting may be used to prevent unauthorised switching between Auto and Manual modes. A setting of 0000 gives unrestricted mode changes.
Sw off delay:	<input type="checkbox"/> NO	<input type="checkbox"/> YES	<b>(YES or NO)</b> This feature may be used to inhibit an accidental or unauthorised switch off of the unit. When a YES setting is made, the Autostart will only power down by pressing and holding the front facia <input type="radio"/> (off/reset) button for approximately 10 seconds.
RS 485 addr:	<input type="checkbox"/> 1	<input type="checkbox"/>	<b>(0 - 32) AS732 only.</b> Each unit on an RS485 network needs to be set with a unique address. One AS732 must be designated the 'master' unit (address 1); all other units (addresses 2 – 32) are designated 'slaves'. The RS485 'master' unit must be used for any RS232 link to the system (e.g. for modem communications).
Store changes?			This screen appears on completion of the program setting sequence. Select YES ( <input type="leftarrow"/> ) to store the changes just made and exit program mode, or NO ( <input type="rightarrow"/> , <input type="triangle-up"/> , or <input type="triangle-down"/> ) to return to 'start delay' and step through the program settings again.



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